THE SOURCE OF SOUTH AFRICAN TREMATODES

BY

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According to the literature that was available up till 1915, the only fresh-water snail that was held to be responsible for the development of trematode parasites of man and beast in South Africa was a minute species which had been shown to be responsible for Fasciola disease in other lands, namely *Limnaea truncatula*. I have examined some of the very few examples of this rare snail from the Transvaal ; but, as it had not been found infested with cercariae in South Africa, its existence may be regarded as of very little practical importance fron a disease-prevention point of view. The shell of *L. truncatula* is about 5 mm. in length. I have repeatedly shown that *Limnaea natalensis* is the usual carrier of the Fasciola parasites and its shell is probably the largest of its kind in the Union. I have collected an example from the Umhlangana that was fifteen-sixteenths of an inch in length. An occasional carrier of fasciolae and the usual carrier of the various schistosomes in South Africa, *Physopsis africana*, is about the same size. I found an example in the Durban suburbs that was 20 mm. in length. The shell closely resembles that of *Isidora globosa*, Morelet, of which I have obtained examples up to 19 mm. in length from Lourenço Marques. *Isidora tropica*, a common carrier of amphistomes and an occasional carrier of schistosomes, is common all over the Union. I have collected examples measuring 16 mm. in length, both from Schuttes' Draai, O.F.S., and from Durban. Another common carrier of trematodes is *Planorbis pfeifferi* and I have an example from the Umbilo 15 mm. in diameter.

We may say that the commoner fresh-water snails of South Africa that are responsible for trematode parasitic diseases, possess shells which measure from 15 to 20 mm. in length. However, *Melanoides tuberculata*, which is heavily infested at the Natal Coast, has an operculated shell which at Durban measures 31 mm. in length.

There are, however, a large number of smaller South African shells which may be overlooked in examining collections of semi-stagnant water for the possible presence of intermediary hosts. First in importance is *Isidora forskali* whose shell is about the size of *Limnaea truncatula* but dextral. In the smaller spruits all over the Union this common fresh-water snail is infested with amphistomes. These common parasites of cattle and sheep cause so few symptoms that little attention has been paid to their life-history. There is an incredible number of very minute shells to be found attached to reeds and floating wood which have escaped the attention they deserve as carriers of disease, probably because they usually reach a diameter of not more than 5 mm. and because their shells are so fragile. The largest genus of the *Ancylidae* is *Burnupia* and the shells of the various species measure from 3 to 9 mm. in length, whilst the *Ferrissia* and *Gundlachia* are seldom more than 4 mm. in length. I have repeatedly examined these snails for parasites, but could find no trace of infection, until in October, 1923, I found cercariae with divided tails in *Burnupia trapezoidea* (Bttg.) at Schuttes' Draai, O.F.S. Dr. E. C. Faust is describing these monostomes for me; they are about the same size as *Schistosoma*. Similar monostomes were present in *Burnupia capensis natalensis* from a small spruit at Escombe, Natal, in June, 1924. The head was 0·13 mm. in length and both tail and prongs 0·175 mm. in length, making a total length of this narrow cercaria of 0·48 mm. The shell from which these cercariae escaped was only 4 mm. in length. They were sporocyst-produced. In May, 1924, I found redia-produced distomes in two distinct species of *Burnupia* at Avoca, Natal. *Burnupia stenochorias* M. and P., *B. capensis natalensis*, Walker, and *B. caffra*, Krauss, are all present in this locality. The shell of one infested *Burnupia* was only 4 mm. in length and none were more than 6 mm. in length. The cercaria possessed a chain of cystogenous particles on each side of the body and measured 0·6 mm. in total length.

It is very difficult to extract the animal from these smaller shells for the examination of cercariae and, having convinced oneself of the presence of cercariae, to keep the entire shell for identification. However, I obtained numerous *Ferrissia* (?) *connollyi* from a small pool at Malvern, Natal, said to contain tortoises, and, having

extracted the animal from a shell only 3 mm. long by means of a dental needle, found it infested with *Megalodiscus sp.* (?) measuring 0·525 mm. in length and about 0·4 mm. in breadth. This pool also contained an interesting *Gundlachia* besides *Isidora forskali.*

There is a small water-lily pool in the Botanic Gardens at Durban in which are kept gold-fish and ' millions.' Attached to the leaves of the water-lilies are a few examples of *Limnaea natalensis,* the common intermediary host in this country for *Fasciola gigantica,* as well as examples of *Ferrissia natalensis* and *F. burnupi.* Microscopic examination of these *Ferrissiae* revealed, in a large proportion of snails dissected, a styletted cercaria about 0·26 mm. in total length, the undivided tail being half the length of the body. One infected example measured only 2 millimetres in length. The identity of this distome is being investigated ; but its presence in so minute a shell emphasises the importance of examining shells so minute as those of *Ferrissia* and *Gundlachia* for the possible presence of trematode parasites. The *Limnaeae* were free from infestation.

Various cercariae have been obtained from *Planorbinae* no more than 4 mm. in diameter and *Segmentina planodiscus,* whose shell is only slightly larger, harbours a rather large eye-spotted schistosome at the Durban Country Club.

South African trematodes develop more frequently in fresh-water snails whose shells are from 15 to 20 mm. in length ; but those species whose shells are no more than 4 to 6 mm. in diameter are occasional carriers of these parasites and prophylactic measures must be directed towards the possible eradication of all varieties, now that, for the first time, trematodes have been isolated from *Ferrissia* and from more than one species of *Burnupia.* In a young country there is a tendency to overlook the large amount of apparently unnecessary and arduous work that must be carried out before one can speak with confidence in regard to those measures which farmers must adopt, if they are to keep their farms free from parasitic diseases. Some years ago I urged the Union Government to introduce domesticated duck in order to keep down the number of Bilharzia-producing snails along the course of the Umbilo river at Pinetown and Sarnia. Instead of carrying out this suggestion, the Government investigated the desirability of introducing otters

into the river. As a matter of fact otters feed on crabs and, as crabs feed readily on snails, otters would indirectly have helped to increase the number of fresh-water snails in this badly-infested river.

Careful study of Bilharzia infection along natural history lines in Natal, over a period of several years, confirms the opinion of other workers and convinces me that our efforts must be directed towards :—

(1) The introduction of domesticated duck wherever possible.

(2) The use of lime or of Ross's larvicide in small collections of water.

(3) Drying up collections of water, at any rate for a week at a time, and this would appear to be the best method of dealing with the minuter fresh-water snails.

(4) Though it has only a limited application, at seaside resorts, in Natal we might follow nature's example where the inflow of sea-water into the lagoons destroys those fresh-water snails that are continually being carried down to the lagoons.

(5) The collection and destruction of such species as *Melanoides tuberculata*, whose operculated shell is to be found in incredible numbers in the Durban water-cress beds, and has been shown to be too stout for ducks to eat.